

IN THE CLAIMS:

Claims 1 – 9 (Previously Cancelled in Response to Restriction Requirement)

1 10. (Currently Amended) A method of regulating a concentration of methanol in a direct
2 methanol fuel cell system, the system including a direct methanol fuel cell being used to pro-
3 vide power to an application device, comprising the steps of:
4 using a detector to sense changes in an output power level of said fuel cell and producing a
5 signal indicative of said changes; and
6 using said signal to drive a concentration regulator which responsively controls the
7 amount of methanol supplied to said fuel cell's anode in response to changes sensed
8 in said output power level.

1 11. (Original) The method as in claim 10 wherein said concentration regulator is
2 constructed using MEMS fabrication techniques.

1 12. (Currently Amended) [The method as in claim 11 wherein] A method of regulating a
2 concentration of methanol in a direct methanol fuel cell system, including a direct methanol
3 fuel cell, comprising the steps of:
4 using a detector to sense changes in an output power level of said fuel cell and producing a
5 signal indicative of said changes; and using said signal to drive a concentration regulator
6 which responsively controls the amount of methanol supplied to said fuel cell's anode in re-
7 sponse to changes sensed in said output power level, said concentration regulator [comprises]
8 comprising a microactuator mechanically coupled to said anode and operable in response to
9 said detector to increase or decrease a flow of methanol to said anode.

1 13. (Original) The method as in claim 12 wherein said microactuator comprises an
2 enclosed chamber mechanically coupled to a flow plate which supplies methanol to said an-
3 ode, said chamber being filled with a control liquid in which a resistive element is disposed,
4 said resistive element operable in response to said detector to heat said liquid and thereby
5 exert pressure on said flow plate, whereby the flow of methanol to said anode is varied.

1 14. (Currently Amended) The method as in claim [11] 12 wherein said concentration
2 regulator comprises a microactuator integrated with said anode.

1 15. (Currently Amended) The method as in claim [11] 12 wherein said concentration
2 regulator comprises a microactuator mechanically coupled to a gas diffusion layer and oper-
3 able in response to said detector to increase or decrease a flow of methanol to said anode.

1 16. (Currently Amended) The method as in claim [11] 12 wherein said concentration
2 regulator comprises a microactuator integrated with a gas diffusion layer and operable in re-
3 sponse to said detector to increase or decrease a flow of methanol to said anode.

1 17. (Original) The method as in claim 10 wherein said concentration regulator is
2 constructed using non-MEMS fabrication techniques.

1 18. (Original) The method as in claim 10 wherein said concentration regulator is
2 constructed using a combination of MEMS and non-MEMS fabrication techniques.

Claims 19 – 27 (Previously Cancelled in Response to Restriction Requirement)

1 28. (Currently Amended) A method of regulating a concentration of fuel in a direct oxi-
2 dation fuel cell system, including a direct oxidation fuel cell being used to provide
3 power to an application device, comprising the steps of:
4 sensing changes in potential at an anode or load level of said fuel cell system; and

5 using said sensed changes in potential to drive a concentration regulator which re-
6 sponsively controls the amount of [methanol] fuel supplied to said fuel cell's anode
7 when said power level increases and decreases, thereby minimizing cross-over of
8 [methanol] fuel through said fuel cell's membrane electrolyte.

1 29. (Original) The method as in claim 28 wherein said concentration regulator is
2 constructed using MEMS fabrication techniques.

1 30. (Currently Amended) [The method as in claim 29 wherein] A method of regulating a
2 concentration of fuel in a direct oxidation fuel cell system comprising the steps of:
3 sensing changes in potential at an anode or load level of said fuel cell system; and
4 using said sensed changes in potential to drive a concentration regulator which re-
5 sponsively controls the amount of fuel supplied to said fuel cell's anode when said
6 power level increases and decreases, thereby minimizing cross-over of fuel through
7 said fuel cell's membrane electrolyte, and said concentration regulator [comprises]
8 comprising a microactuator mechanically coupled to said anode and operable in re-
9 sponse to said detector to increase or decrease a flow of methanol to said anode.

1 31. (Original) The method as in claim 30 wherein said microactuator comprises an
2 enclosed chamber mechanically coupled to a flow plate which supplies methanol to said an-
3 ode, said chamber being filled with a control liquid in which a resistive element is disposed,
4 said resistive element operable in response to said detector to heat said liquid and thereby
5 exert pressure on said flow plate, whereby the flow of methanol to said anode is varied.

1 32. (Currently Amended) The method as in claim [28] 30 wherein said concentration
2 regulator comprises a microactuator integrated with said anode.

1 33. (Currently Amended) The method as in claim [28] 30 wherein said concentration
2 regulator comprises a microactuator mechanically coupled to a gas diffusion layer and oper-
3 able in response to said detector to increase or decrease a flow of methanol to said anode.

1 34. (Currently Amended) The method as in claim [28] 30 wherein said concentration
2 regulator comprises a microactuator integrated with a gas diffusion layer and operable in re-
3 sponse to said detector to increase or decrease a flow of methanol to said anode.

1 35. (Original) The method as in claim 28 wherein said concentration regulator is
2 constructed using non-MEMS fabrication techniques.

1 36. (Original) The method as in claim 28 wherein said concentration regulator is
2 constructed using a combination of MEMS and non-MEMS fabrication techniques.

1 37. (Previously Added) The method of regulating a concentration of methanol in a di-
2 rect methanol fuel cell system, as defined in claim 10, including the further step of
3 when said detector senses a low output power level of said fuel cell and said concen-
4 tration regulator indicates a high concentration of methanol, using said signal to drive said
5 concentration regulator to responsively decrease the amount of methanol supplied to said an-
6 ode thereby substantially minimizing cross-over of methanol through said fuel cell's mem-
7 brane electrolyte.

1 38. (Previously Added) The method of regulating a concentration of methanol in a di-
2 rect methanol fuel cell system, as defined in claim 10, including the further step of
3 when said detector senses a high output power level of said fuel cell and said concen-
4 tration regulator indicates a low concentration of methanol, using said signal to drive said
5 concentration regulator to responsively increase the amount of methanol supplied to said an-
6 ode thereby providing optimal methanol concentration while substantially minimizing cross-
7 over of methanol through said fuel cell's membrane electrolyte.

1 39. (Previously Added) The method of regulating a concentration of methanol in a di-
2 rect methanol fuel cell system as defined in claim 28 including the further step of
3 when a change in said potential of said fuel cell indicates an increase in a high power
4 operating fuel cell, and methanol concentration indicated by said concentration regulator is
5 low, using said signal to drive said concentration regulator to responsively increase the
6 amount of methanol supplied to said fuel cell's anode, to produce an optimal amount of
7 methanol being supplied to said anode, while substantially minimizing methanol crossover.

1 40. (Previously Added) The method of regulating a concentration of methanol in a di-
2 rect methanol fuel cell system as defined in claim 28 including the further step of
3 when a change in said potential of said fuel cell indicates an increase in a low
4 power operating fuel cell, and methanol concentration indicated by said concentration regu-
5 lator is high, using said signal to drive said concentration regulator to responsively decrease
6 the amount of methanol supplied to said fuel cell's anode, to substantially minimize methanol
7 crossover.

Claims 41 -44 (Cancelled in Response to Restriction Requirement)